

Chapter 1

Introduction

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1.1 PROJECT IDENTIFICATION AND PURPOSE

The Town of Mashpee's (Town) Watershed Nitrogen Management Plan (WNMP) project was initiated in 1999 to address the Town's need for reducing nitrogen impacts to its coastal embayments and to evaluate all options for restoring those embayments. The project was put on hold as it awaited the results of the Massachusetts Estuaries Project (MEP). The MEP's reports on Popponesset Bay and the Waquoit Bay East (specifically the Quashnet River, Hamblin Pond, and Jehu Pond) watershed systems were released in late 2004 and early 2005, respectively. The findings as developed in those reports are summarized in this report and will be used in the development of the nitrogen management needs and recommended plan for the Project Planning Area (PPA).

The Town of Mashpee, which makes up the majority of the land area of the PPA, is located on the southern side of Cape Cod, bordered by the towns of Falmouth, Sandwich, and Barnstable, as shown in Figure 1-1. This figure also illustrates the PPA which includes the following areas:

- The entire town of Mashpee
- The Popponesset Bay watershed that extends into the towns of Barnstable and Sandwich, as defined by the MEP
- The Waquoit Bay East watershed that extends into the towns of Falmouth and Sandwich, as defined by the MEP

This planning area is designed to identify the wastewater, stormwater, and other nitrogen related problems in the Town of Mashpee and the portions of the adjacent towns located within the Popponesset Bay and Waquoit Bay East watersheds.

The purpose of the WNMP Project is to provide an environmentally and economically sound plan for nitrogen reduction, wastewater treatment, and effluent recharge in the PPA. The WNMP will be based on the MEP findings of the associated Total Maximum Daily Loads (TMDLs) for the two watersheds. It will identify other wastewater needs in the PPA, and it will ultimately propose alternatives and a recommended plan to address the effects of the wastewater loads and other nitrogen loadings.

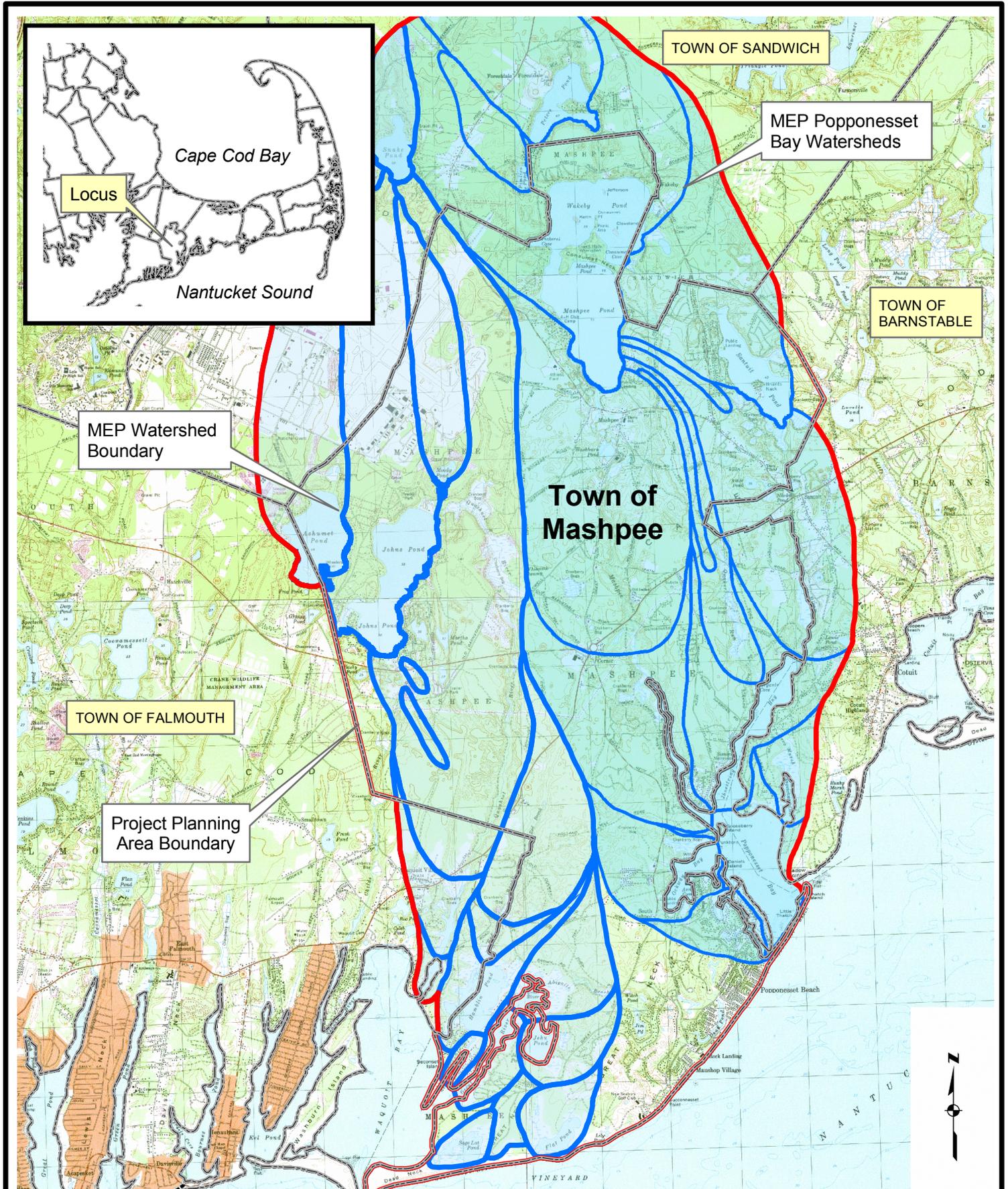
This Needs Assessment Report is the first phase of this long and comprehensive project. It is designed to develop the understanding of existing and future conditions in the PPA that will be used throughout the entire WNMP project, and to complement the work of the MEP.

1.2 PROJECT BACKGROUND AND ISSUES

Mashpee is the fastest-growing town on Cape Cod (according to US Census data). During the 1980s, its population was the fastest growing in New England, increasing by 113%. At the same time, it is located almost entirely within the watersheds of two shallow, nitrogen-sensitive embayments – Popponesset Bay and Waquoit Bay East. The estuarine systems of both bays have shown significant signs of degradation, which has been documented to be attributable to excessive inputs of nitrogen.

The main source of nitrogen is the sub-surface disposal of domestic wastewater through septic systems or cesspool systems and the migration of the nitrogen in the wastewater to the estuary via groundwater. The MEP reports have documented these impacts and the quantity of nitrogen that needs to be removed (in one potential scenario) to meet proposed nitrogen TMDLs for these two estuary systems. The other main sources of wastewater nitrogen are the eight (8) small wastewater treatment facilities (WWTFs) in Mashpee and one WWTF in Sandwich, also located within the PPA (one additional WWTF will be discussed in Chapter 6 because of its potential use as part of the WNMP).

Other sources of nitrogen include the precipitation that falls on natural areas, roofs, and paved roads or parking areas; the application of fertilizers to vegetation; and the presence of domestic



*The Project Area is the combination of the Town of Mashpee area and the watersheds of Popponesset Bay and Waquoit Bay-East as delineated by the Massachusetts Estuaries Project (MEP)

Data Source: Mass GIS
 File Location: J:\GIS\GIS Project Folder\Job#\00074 Mashpee\2006 WWFP\Report Figures\00074F01_Locus.mxd

 **Stearns & Wheeler, LLC**
 Environmental Engineers and Scientists

HYANNIS, MASSACHUSETTS
 phone: (508) 392-6800
 web: www.stearnswheler.com

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TOWN OF MASHPEE, MASSACHUSETTS

Watershed Nitrogen Management Plan

LOCUS MAP

FIGURE 1-1

and wild animals. Reduction in these other types of nitrogen loadings is also a goal of the community and of the WNMP project, but the source of nitrogen that appears most amenable to reduction using available technology is domestic wastewater.

The Towns of Mashpee and Sandwich currently have no municipal sewer system; the municipal sewers in Falmouth and Barnstable do not extend into the PPA. Since 1988, Mashpee has had a Sewer Commission with full authority, given funding, to implement such a system for the town. In the late 1990s, the Board of Selectmen also created a “Watershed Management Committee,” now defunct, in response to resident concerns about coastal water quality, particularly in the Mashpee River estuary. The Committee engaged in an active debate about nitrogen loading issues, suggested certain regulatory changes, secured Town Meeting approval of funding for consultant studies of ecological conditions in the Popponesset Bay estuary, and presented a public education program on the issue entitled “Mashpee’s Watershed Year 1997-98”. In addition, in May of 1998 Town Meeting adopted a Local Comprehensive Plan (as directed by the Cape Cod Commission’s Regional Policy Plan) that included a section on “Water & Wastewater Facilities” (with the Wastewater portion drafted by the Planning Department and Sewer Commission and approved by the Planning Board). The Water and Wastewater Facilities section included a concept plan illustrating possible approaches to wastewater treatment improvements. However, there is no wastewater sewer district governing the entire PPA as a whole.

The WNMP is a more formal next step, intended to recommend a cost-effective and “politically” feasible means to address the nitrogen loading problem. This WNMP is likely to include municipal wastewater treatment facilities along with other facilities and management structures to accomplish the goals of the plan.

Mashpee’s WNMP process started in 1999 with the approval of project funding by Town Meeting, subject to receipt of a State Revolving Fund (SRF) loan, which was received in 2001. The Sewer Commission contracted with the Center for Marine Science and Technology (CMaST) at the University of Massachusetts Dartmouth to provide the nitrogen modeling and targets for the Town’s coastal embayments and with Stearns & Wheler to develop facilities plans to meet those targets. (CMaST is now known as SMAST – the School for Marine Science and

Technology.) However, in 2001, SMAST teamed with a group consisting of the Massachusetts Department of Environmental Protection (MADEP), the US Environmental Protection Agency (USEPA), the Executive Office of Environmental Affairs (EOEA), and the Cape Cod Commission (CCC) to form the MEP. The MEP was developed to evaluate and quantify nutrient impacts to 89 estuaries in Southeastern Massachusetts. The creation of the MEP has prompted an even greater awareness of wastewater impacts (namely from nitrogen) to Mashpee's estuaries and natural resources.

As stated above, the MEP is a combined effort to address impacts to 89 southeastern Massachusetts estuaries. Additional information on this effort can be viewed at www.state.ma.US/dep/smerp/smerp.htm. The main components of this effort include:

1. Watershed delineation by United States Geological Survey (USGS) staff.
2. Multi-year water quality monitoring by the Town of Mashpee, the Cotuit Waders, and other volunteers working with SMAST.
3. Nitrogen loading assessment for the watershed by the CCC Water Resources staff. Existing and build-out projections of land use (by parcel) were provided by the Mashpee Planning Department. Water use data was obtained from each respective Water District or Department.
4. Tidal flushing evaluations and hydrodynamic model development by Applied Coastal Research and Engineering, Inc. (ACRE).
5. Specialized coastal surveys, monitoring, and analysis by SMAST staff and development of water quality models.
6. Nitrogen concentration thresholds and loading limits development by SMAST, MADEP, and ACRE staffs.

7. Technical guidance information development.

With the creation of the MEP and its work to evaluate Popponeset Bay and the Waquoit Bay East system, the WNMP planning process was put on hold until the MEP efforts were completed. Nitrogen limits for the Popponeset Bay estuary were determined by the MEP in September 2004; nitrogen limits for the Waquoit Bay East estuary (Quashnet River, Hamblin Pond, and Jehu Pond) were determined by the MEP in January 2005. The nitrogen limits led to the development of TMDLs for these embayments; the TMDLs were issued in April 2006 (Final) and October 2005 (Final Draft), respectively. The needs assessment process was resumed after release of this information. The WNMP will build upon this information developed by the MEP and MADEP.

The following other regional projects on Cape Cod are proceeding concurrently with the development of the Town's WNMP. Useful information developed as part of these efforts will be incorporated into the findings of the WNMP. Efforts are being made by the Town of Mashpee to coordinate the WNMP with these ongoing efforts.

A. Barnstable County Regional Efforts. Barnstable County has initiated several regional efforts that are ongoing or recently completed, as briefly discussed below:

1. Formation and coordination of the Cape Cod Water Protection Collaborative (Collaborative), which meets monthly to discuss wastewater initiatives and coordinate information between towns. Selectman John Cahalane is the Town representative to this group and has participated regularly. The Collaborative is the result of the efforts by the Barnstable County Blue Ribbon Panel, formed to review the Cape Cod Business Round Table's proposal for county-wide wastewater management authority efforts, as well as other county efforts.

2. Establishment of a Technical Advisory Committee (TAC) to the Collaborative, made up of wastewater and planning professionals appointed by the County Commissioners to advise the Collaborative. The TAC replaced the County's Wastewater Implementation Committee (WIC), which had provided County-wide coordination of wastewater initiatives prior

to the establishment of the Collaborative. Mashpee Sewer Commissioner and Town Planner F. Thomas Fudala serves on the TAC.

3. Distribution and administration of County appropriations through the WIC to develop scientific, engineering, and management information to support nitrogen and wastewater management studies. These efforts included the following related projects:

- A report entitled “*Enhancing Wastewater Management on Cape Cod: Planning, Administrative, and Legal Tools*” (“Tools Report” July 2004), to investigate planning, administrative, and legal tools for improving wastewater management on the Cape, including a case study on issues involved in integrating private wastewater treatment facilities into a municipal wastewater management system in Mashpee.
- A project, performed by Stearns & Wheeler, to evaluate the use of computer models (SewerCAD) to evaluate potential sewer systems, which used the Popponeset Bay watershed as a Case Study (Sewer Modeling and Preliminary Design Evaluations, Guidance Document and Case Study Report, November, 2005).
- County and federally-funded project by the USGS to utilize a USGS regional groundwater particle tracking model and staff expertise to evaluate potential well and effluent recharge sites in several Cape towns, including a series of alternative wastewater recharge scenarios in Mashpee.

B. Popponeset Bay Pilot Project. In addition to these County initiatives, a USEPA Water Quality Cooperative Agreements Watershed Permitting Grant funded an ongoing MADEP project entitled *Protecting Coastal Waters through Watershed-Wide Permitting and Nutrient Trading in Three Massachusetts Estuaries*, (including Popponeset Bay) better known as the “Pilot Project,” to develop guidance and permitting tools in four (4) areas: watershed-based permitting, cross-community interaction and regulation, nitrogen trading issues such as trading mechanisms, monitoring, and compliance, and MADEP policy and permitting for watershed-based nutrient control. The project has also involved investigating possible nitrogen load

allocations to the three towns that share the watershed as well as the use of watershed modifications to promote greater natural attenuation of nitrogen in the watershed.

These four regional projects discussed above have developed valuable information that will enhance the Town's WNMP.

1.3 PROJECT SCOPE

The WNMP Project Scope is divided into the following phases listed below:

- Phase I Review of Existing Data
- Phase II Needs Estimates/Projected Flows
- Phase III Screening of Alternative Technologies and Techniques
- Phase IV Development and Evaluation of Alternative Scenarios
- Phase V Conceptual Design and Cost Estimates for Selected Scenarios
- Phase VI Recommended Plan
- Phase VII Preliminary Designs and Costs for Effluent Pipeline
- Phase VIII Environmental Review Documents
 - Environmental Notification Form (ENF) and MEPA Unit/CCC Joint Review Form Document
 - Needs Assessment Report
 - Screening Analysis Report
 - Alternative Plan and Draft Environmental Impact Report (EIR)
 - Alternative Plan and Final EIR
- Phase IX Public Participation Outreach
- Phase X Project Administration

1.4 ENVIRONMENTAL REVIEW PROCESS

A Joint Environmental Review Process by the EOEA MEPA Unit (MEPA Unit) and CCC has been initiated for this Project. As such the following five (5) documents will be prepared and submitted for review:

- ENF and MEPA Unit/CCC Joint Review Process Application Form
- Needs Assessment Report
- Alternatives Screening Analysis Report
- Draft Nitrogen and Wastewater Management Plan and EIR
- Final Nitrogen and Wastewater Management Plan and EIR

The ENF and Joint Review Process Application Form was submitted for MEPA and CCC review in September 2001, and the subsequent Certificate of the Secretary of Environmental Affairs was filed on November 9, 2001. The full Certificate is attached in Appendix A.

All of the documents to be reviewed by MEPA and CCC will be prepared in accordance with the Memorandum of Understanding between the CCC and the Secretary of Environmental Affairs. Each of these documents will be submitted to MADEP, the MEPA Unit, the CCC, and other interested parties for review and comment. Each document will be submitted with the Proposed Scope of Work for the next document to be produced. It is hoped that this approach will promote the public involvement and comment needed to build a consensus for implementation of the recommended plan.

1.5 FORMATION OF A COMMUNITY ADVISORY COMMITTEE (CAC)

The Town of Mashpee has formed a Community Advisory Committee (CAC) to advise the Sewer Commission on the Project and to assist in its implementation. The CAC includes the following representation:

- A representative from each of the five (5) electoral precincts of Mashpee

- Representatives from the following organizations:
 - Mashpee Board of Health
 - Mashpee Conservation Commission
 - Mashpee Waterways Commission
 - Mashpee Historical Commission
 - Mashpee Wampanoag Indian Tribal Council
 - Mashpee Shellfish Commission
 - Mashpee Chamber of Commerce
 - Mashpee Environmental Coalition
- A representative from the adjoining Towns of Barnstable, Falmouth, and Sandwich

1.6 PURPOSE AND ORGANIZATION OF NEEDS ASSESSMENT REPORT

The Needs Assessment Report is written to summarize the work identified in Phase I and Phase II of the Project Scope. This includes the research and description of existing and future conditions in the PPA as related to nitrogen loads and related water quality issues.

This Needs Assessment Report is divided into ten chapters. **Chapter One** presents general introductory information about the Watershed Nitrogen Management Planning Project. **Chapter Two** describes the technical documents reviewed along with Town and regional data. **Chapter Three** identifies the regulatory issues (local, regional, State, and Federal) that must be considered during the Project. **Chapter Four** discusses the Massachusetts Estuaries Project's efforts related to the PPA. **Chapter Five** describes the PPA's existing conditions related to environmental resources and demographics. **Chapter Six** describes the PPA's existing wastewater treatment facilities. **Chapter Seven** discusses the existing and future wastewater flows and nitrogen loading. **Chapter Eight** evaluates and identifies the wastewater nitrogen priority areas in the PPA. **Chapter Nine** provides a summary of the wastewater nitrogen needs. **Chapter Ten** identifies funding opportunities that are available.